Product Brief

Intel® Xeon® Processor 3400 Series

Intel® Xeon® Processor 3400 Series-based Platforms

A new generation of intelligent server processors delivering dependability, productivity, and outstanding performance

Dependability, productivity, and intelligent performance for real server applications

Businesses today need to be productive all day, every day. Intel® Xeon® processor 3400[1] series-based servers provide businesses with technologies designed to deliver 24/7 dependability to help them improve productivity and performance that automatically adapts to changing workloads at an entry-level price point.

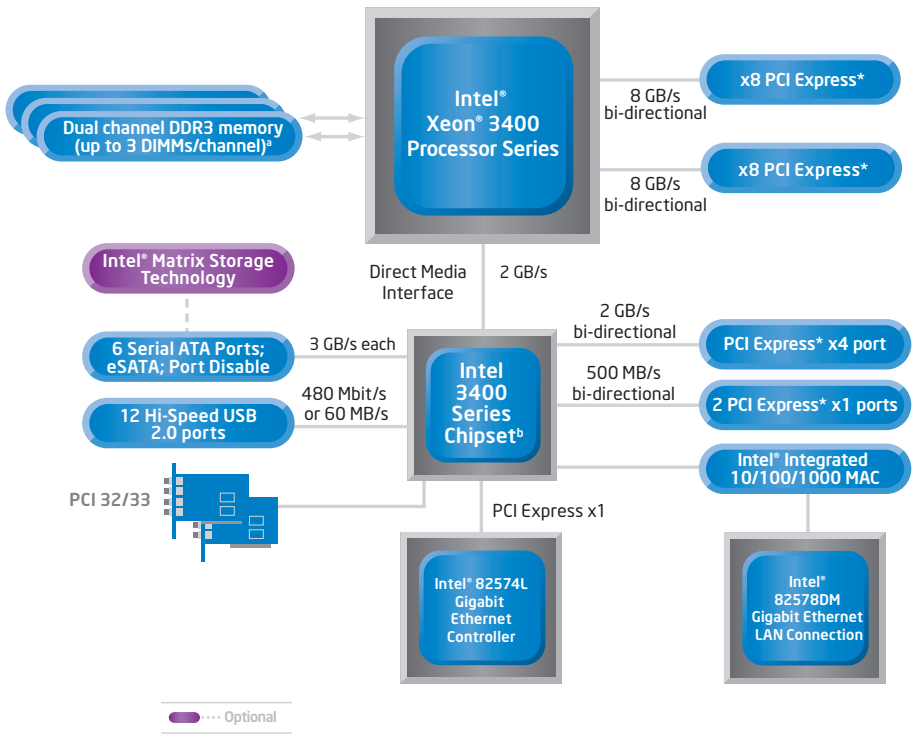
Based on Intel® microarchitecture, codenamed Nehalem, the Intel Xeon processor 3400 series is designed with innovative features that adapt performance to software and business needs, help energy consumption for optimum performance and efficiency, and enable hardware-based virtualization capabilities. The capabilities found in servers featuring the Intel Xeon processor 3400 series make them ideal for small businesses stepping up to a first server, companies requiring a dedicated server for a workgroup, or education departments that need a server to support multiple clients.

Trust Your Company to Intel's Proven Server Technology

With nearly 40 million Intel® processor-based servers shipped since 1996, and a 20-year track record of delivering enterprise-class performance, more companies trust their businesses to Intel processor-based servers. Intel Xeon processor-based entry-level servers give companies the dependability, improved productivity, and performance they need to focus on their business instead of their computers.

Our entry-level server platforms are comprehensive solutions that have the flexibility to grow with your business. We combine effective technologies, software, and industry alliances to give you servers optimized for your business with incredible value. Intel has used its world-class manufacturing technology combined with its next-generation microarchitecture (codenamed Nehalem) to deliver innovative features that provide compelling performance for value-conscious customers. You can count on Intel to deliver superior quality and reliability to drive your business forward.

Server Platform Architecture



[a]Up to 3 DIMMs per channel with registered DIMMs. 2 DIMMs per channel with unbuffered DIMMs.
[b]Intel® 3420 Chipset features shown.

Figure 1. Intel® Xeon® processor 3400 series and Intel® 3400 series chipsets.

The Ideal Entry-level Server

Entry-level server platforms featuring the Intel Xeon processor 3400 series and the Intel 3400 series chipset are ideal for value-conscious organizations looking for their first server or a replacement for an older server. These platforms are designed to deliver 24/7 dependability and improve business productivity with industry-leading performance. These new server platforms are easy to set up and manage, provide trouble-free operation and help ensure that your operational needs are met at every stage of your business growth. Our entry-level server platforms integrate the most advanced technologies:

- **Innovative Integration –** Intel® Xeon® processor 3400 series is based on the next-generation Intel microarchitecture, with an integrated high speed, 1333 MHz dual-channel DDR3 memory controller and flexible x16 PCI Express* 2.0 controller. The Intel® 3400 series chipset offers additional PCI Express I/O for even more expansion possibilities.
- **Memory Flexibility –** Intel Xeon processor 3400 series provides flexible memory configurations with support of up to 16 GB of memory with DDR3 Unbuffered DIMMs or 32 GB of memory with DDR3 Registered DIMMs.
- **Memory Error Correction –** The Intel Xeon processor 3400 series supports Error Correcting Code (ECC) memory to improve reliability and integrity of data by keeping system running by self correcting memory errors.
- **Power-Saving Architecture –** The Intel Xeon processor 3400 series includes architectural improvements such as Integrated Power Gates that reduce idle CPU cores to near zero power and Automated Low Power States that adjust system power consumption based on real-time CPU loads.
- **Intel® Turbo Boost Technology[2] –** The Intel Xeon processor 3400 series is designed with innovative features that adapt performance to software and business needs. With Intel® Turbo Boost Technology, applications take advantage of higher speed execution on demand by using available power to run at a higher frequency.
- **Intel® Hyper-Threading Technology[3] –** For applications that lend themselves to parallel, multi-threaded execution, Intel® Hyper-Threading Technology enables simultaneous multi-threading within each processor core, improving multi-threaded application performance.
- **Lower Power Option –** The Intel® Xeon® processor L3426 operates at only 45W thermal design power (TDP) which provides a 50W TDP reduction from our standard power processors. The lower TDP makes this processor ideal for building entry-level servers for thermally sensitive, space-constrained environments.
- **Improved Virtualization Experience –** Intel® Virtualization Technology[4] provides hardware assist to virtualization software, enabling your servers to support both 32-bit and 64-bit operating systems and applications on the same server.
- **Gigabit Ethernet –** Intel® 82574L Gigabit Ethernet Controller and Intel® 82578DM Gigabit Ethernet Connection provide gigabit Ethernet LAN connectivity for high-speed network access.
- **External SATA* Support –** Native support of external SATA ports (eSATA), combined with Intel® Matrix Storage Technology (Intel® MST), provides the flexibility to add an external drive for increased data storage. Support for eSATA enables the full SATA interface speed of up to 3 Gb/s outside the chassis.
- **Data Reliability with RAID –** Supports Frame Information Structure (FIS)-based port multipliers, and RAID levels 0, 1, 5, and 10 enable greater reliability for personal data, or maximum storage performance for intensive applications.
- **Fast and Easy Recovery –** Intel® Rapid Recover Technology (Intel® RRT) provides RAID level 1 configurations, a fast, easy-to-use method to boot instantly off a hard drive clone allowing the end user to recover their data and quickly return their system to an operational status.

Protect Your Critical Data with 24/7 Dependability

Intel Xeon processor 3400 series-based platforms support Error Correction Code (ECC) memory for a high level of data integrity, reliability, and system uptime. ECC can detect multiple-bit memory errors, and locate and correct single-bit errors to keep business applications running smoothly.

With Intel MST, support for RAID levels 1, 5, and 10 data is protected from drive failure through drive redundancy. With RAID 5, digital assets are protected by writing data to multiple hard drives. This makes data recovery easy by simply replacing the failed drive. Intel RRT provides RAID level 1 configurations in a fast, easy-to-use method allowing the end users to recover their data and return their system to an operational status. This is accomplished by supporting the capability to boot instantly off of a hard drive clone.

Improved Productivity

Intel Xeon processor 3400 series-based platforms support technologies that are designed to improve productivity of your server applications. The Intel Xeon processor 3400 series supports up to 6 RDIMMs for flexible memory configurations and future cost-effective upgrades as your business grows. The processors also support up to 32 GB of DDR3 memory to support applications that are memory bound.

Intel MST with Intel® 3420 chipset can improve server performance on disk-intensive retrieval applications by using RAID 0, 5 or 10. In RAID 0 volumes of two drives, and RAID 5 volumes of three to six drives, data can be accessed at higher speeds, because data is striped across multiple drives. Access time is reduced resulting in reduced response time for data-intensive applications. Also, due to drive load balancing, even systems with RAID 1 can take advantage of faster boot times and data reads. In office applications there are more background tasks such as virus scans, data backup, e-mail, and data processing that consume storage resources. Implementing a basic RAID 1 configuration helps alleviate bottlenecks encountered by running these added tasks.

A New Generation of Intelligent Server Processors Delivering Outstanding Performance for Education and Small Businesses

These next-generation Intel Xeon processors based on the Nehalem architecture deliver innovative features that adapt performance to software and business needs, help energy consumption for optimum performance and efficiency to adapt more quickly to your business needs.

Intel® Turbo Boost Technology. Allows the processor to deliver higher speed execution on demand by using available power to run at a higher frequency.

Intel® Hyper-Threading Technology. Enables simultaneous multi-threading within each processor core to reduce computational latency, making optimal use of every clock cycle.

Intel® Intelligent Power Technology.[5] Minimizes power consumption when server components are not used with Integrated Power Gates which allow individual idling CPU cores to be reduced to near-zero power, and Automated Low Power States which automatically put the processor and memory into the lowest available power states to meet the requirements of the workload.

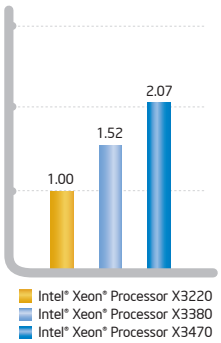
Low-Power Intel® Xeon® L3400 Processor Series. Lower power Intel Xeon processors are available for building entry-level servers for thermally sensitive, space-constrained environments.

Intel® Advanced Smart Cache. A large on-die shared L3 cache that reduces latency to data, helping to improve performance and power efficiency.

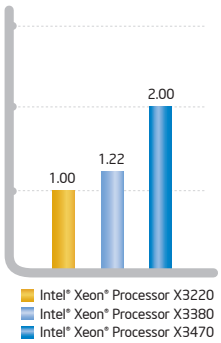
Intel® Xeon® 3400 Processor Series Performance Comparisons

Compute-Intensive Throughput

General Purpose
SPECint*_rate_base2006

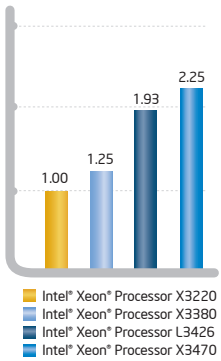


Technical Computing
SPECfp*_rate_base2006

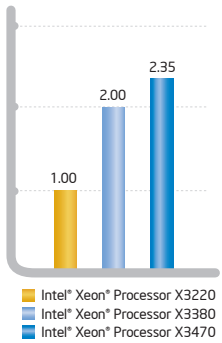


General-Purpose Server

Energy Efficiency
SPECPower_ssj2008 (ssj_ops/watt)



Java* Application Server
SPECjbb* 2005 bops



Server Performance

SPECint*_rate_base2006 on Linux* with X3220 Configuration and Score on Benchmark: Supermicro Motherboard C2SBX* with one Intel® Xeon® processor X3220 (Quad-Core, 2.40 GHz, 8 MB L2 cache, 1066 MHz System Bus), 4 GB (4x1 GB PC3-8500U-7-00-BP, DDR3-1066), Western Digital WD800JD* 80 GB SATA 7200RPM, 64-Bit SuSE* Linux Enterprise Server 10 with SP1. Source: Published result as of April 2008. Score: 53.7.

SPECfp*_rate_base2006 on Linux* with X3220 Configuration and Score on Benchmark: Supermicro Motherboard C2SBX* with one Intel® Xeon® processor X3220 (Quad-Core, 2.40 GHz, 8 MB L2 cache, 1066 MHz System Bus), 4 GB (4x1 GB PC3-8500U-7-00-BP, DDR3-1066), Western Digital WD800JD* 80 GB SATA 7200RPM, 64-Bit SuSE* Linux Enterprise Server 10 with SP1. Source: Published result as of April 2008. Score: 42.5.

SPECint*_rate_base2006 on Linux* with X3380 Configuration and Score on Benchmark: Fujitsu PRIMERGY* RX100 S5 system with one Intel® Xeon® processor X3380 (Quad-Core, 3.16 GHz, 12 MB L2 cache, 1333 MHz System Bus), Hardware Prefetch = Disable, Adjacent Sector Prefetch = Disable, 8 GB (4x2 GB PC2-6400E, 2 rank, CL6-6-6, ECC), SATA 250 GB 7200 rpm, 64-Bit SuSE* Linux Enterprise Server 10 with SP2 (kernel 2.6.16.60-0.21-smp). Source: Published result as of March 2009. Score: 81.6.

SPECfp*_rate_base2006 on Linux* with X3380 Configuration and Score on Benchmark: Fujitsu PRIMERGY* RX100 S5 system with one Intel® Xeon® processor X3380 (Quad-Core, 3.16 GHz, 12 MB L2 cache, 1333 MHz System Bus), Hardware Prefetch = Disable, Adjacent Sector Prefetch = Disable, 8 GB (4x2 GB PC2-6400E, 2 rank, CL6-6-6, ECC), SATA 250 GB 7200 rpm, 64-Bit SuSE* Linux Enterprise Server 10 with SP2 (kernel 2.6.16.60-0.21-smp). Source: Published result as of March 2009. Score: 51.7.

SPECint*_rate_base2006 on Linux* with X3470 Configuration and Score on Benchmark: Intel® BIK Beta system with one Intel® Xeon® processor X3470 (Quad-Core, 2.93 GHz, 8 MB L3 cache), EIST Enabled, Turbo Enabled, HT Enabled, 8 GB memory (4x2 GB DDR3-1333 RDIMM ECC), 146 GB SATA 10000RPM HDD, SuSE* Linux Enterprise Server 11 for x86_64. Source: Intel internal testing as of July 2009. Score: 111.

SPECfp*_rate_base2006 on Linux* with X3470 Configuration and Score on Benchmark: Intel® BIK Beta system with one Intel® Xeon® processor X3470 (Quad-Core, 2.93 GHz, 8 MB L3 cache), EIST Enabled, Turbo Enabled, HT Enabled, 8 GB memory (4x2 GB DDR3-1333 RDIMM ECC), 146 GB SATA 10000RPM HDD, SuSE* Linux Enterprise Server 11 for x86_64. Source: Intel internal testing as of July 2009. Score: 85.2.

SPECpower_ssj2008 with X3220 Configuration and Score on Benchmark: Fujitsu Siemens PRIMERGY* TX150 S6 system with one Intel® Xeon® processor X3220 (Quad-Core, 2.40 GHz, 8 MB L2 cache, 1066 MHz System Bus), Hardware Prefetch = Disable, Adjacent Sector Prefetch = Disable, 8 GB (4x2 GB PC2-6400E-666-12-G3 2R (Samsung)), Seagate ST3160815AS* (SATA, 7.2krpm, 160GB), Microsoft Windows Server* 2003 Enterprise x64 Edition Service Pack 1 Build 3790. Source: Published result as of December 2007. Score: 667.

SPECpower_ssj2008 with X3380 Configuration and Score on Benchmark: Supermicro X7SBE* system with one Intel® Xeon® processor X3380 (3.16 GHz, 2x6 MB L2 cache, 1333 MHz front system bus), HWP and ASP Disabled, EIST Enabled, C1E Enabled, Fan Speed control mode 3-pin (server), 8 GB memory (4x2 GB DDR2-800), 150 GB SATA 10000RPM HDD, Microsoft Windows Sever* 2008 x64-Edition SP1 OS. Source: Intel internal testing as of April 17, 2009. Score: 833.

SPECpower_ssj2008 with X3470 Configuration and Score on Benchmark: Intel® BIK Beta system with one Intel® Xeon® processor X3470 (2.93 GHz, 8 MB L3 cache, 4.8 GT/s @QPI), HWP and ASP Disabled, EIST Enabled, Turbo Disabled, HT Enabled, System Acoustics and Performance Configuration CLTT, 4 GB memory (2x2 GB DDR3-1333), 150 GB SATA 10000RPM HDD, Microsoft Windows Sever* 2008 x64-Edition SP2 OS. Source: Intel internal testing as of July 2009. Score: 1502.

SPECpower_ssj2008 with L3426 New Configuration and Estimated Score on Benchmark: Intel® BIK Beta system with one Intel® Xeon® processor L3426 (1.86 GHz, 8 MB L3 cache, 4.8 GT/s @QPI), HWP and ASP Disabled, EIST Enabled, Turbo Disabled, HT Enabled, System Acoustics and Performance Configuration CLTT, 4 GB memory (2x2 GB DDR3-1333), 150 GB SATA 10000RPM HDD, Microsoft Windows Sever* 2008 x64-Edition SP2 OS. Source: Intel internal projections as of August 2009. Score: 1287.

SPECjbb2005 with X3220 Configuration and Score on Benchmark: Dell PowerEdge* 860 system with one Intel® Xeon® processor X3220 (Quad-Core, 2.40 GHz, 8 MB L2 cache, 1066 MHz System Bus),Hardware Prefetch = Disable, Adjacent Sector Prefetch = Disable, 8 GB (4x2 GB, 533 MHz DDR2 SDRAM), 73 GB SAS, Microsoft Windows Server* 2003 Enterprise x64 Edition + SP1 (64-bit). Source: Published result as of January 2007. Score: 112092.

SPECjbb2005 with X3380 Configuration and Score on Benchmark: Fujitsu PRIMERGY* TX100 S1 system with one Intel® Xeon® processor X3380 (Quad-Core, 3.16 GHz, 12 MB L2 cache, 1333 MHz System Bus),Hardware Prefetch = Disable, Adjacent Sector Prefetch = Disable, 8 GB (4x2 GB PC2-6400E, CL6-6-6), Seagate (3.5", SATA, 250 GB, 7.2krpm), Microsoft Windows Server* 2008 Enterprise x64 Edition + SP2. Source: Published result as of July 2009. Score: 223691.

SPECjbb2005 with X3470 Configuration and Score on Benchmark: Intel® BIK Beta system with one Intel® Xeon® processor X3470 (2.93 GHz, 8 MB L3 cache, 4.8 GT/s @QPI), HWP and ASP Disabled, EIST Enabled, Turbo Enabled, HT Enabled, System Acoustics and Performance Configuration CLTT, 8 GB memory (4x2 GB DDR3-1333), 150 GB SATA 10000RPM HDD, Microsoft Windows Sever* 2008 x64-Edition SP2 OS. Source: Intel internal testing as of July 2009. Score: 263,786 bops.

For more information on performance, please visit
www.intel.com/performance

Intel® Xeon® Processor 3400 Series-based Platform Overview

Features	Benefits
Intel® Xeon® processor 3400[1] series	▪ Designed to support server-class features at an entry-level price point ▪ Tested and validated with server operating systems and applications for peace of mind
Up to 8 MB Shared L3 Cache	▪ Boosts performance while reducing traffic to the processor cores
Larger Memory Capacity	▪ Supports up to 32 GB of Error Correcting Code (ECC) DDR3 DIMMs for better application performance ▪ Support for up to 6 DIMMs for flexible memory configurations
Support for ECC Memory	▪ Protects data by self correcting memory errors to keep the system up and running
Integrated PCI-Express*	▪ Integrated x16 PCI Express* 2.0 serial I/O for reduced board complexity to allow for innovative form factor designs
Intel® Turbo Boost Technology[2]	▪ Delivers on-demand performance to your business applications as needed when processor power headroom is available
Intel® Hyper-Threading Technology[3]	▪ Enables simultaneous multi-threading within each processor core, up to two threads per core or up to eight threads per processor. Hyper-threading reduces computational latency, making optimal use of every clock cycle.
Intel® Virtualization Technology[4]	▪ Provides hardware assist to virtualization software, enabling your server to more effectively support multiple current and legacy operating systems and applications on the same system, allowing businesses to maximize their server investment ▪ Extended Page Tables (EPT) provide better performance by reducing the overhead caused by page-table utilization of virtual machines
Intel® Intelligent Power Technology[5]	▪ Integrated Power Gates that reduce idle CPU cores to near zero power when not in use to lower operating costs through power conservation ▪ Automated Low Power States that adjust system power consumption based on real-time CPU loads
Intel® Matrix Storage Technology for software RAID 0, 1, 5, 10	▪ Accelerates system performance ▪ Protects against hard drive failure and loss of critical business data ▪ Provides a fast, easy-to-use method for the end user to recover their data and return their system to an operational status in the event of a hard drive failure
Optimized for Microsoft Windows Small Business Server* and Linux* Operating Systems	▪ Support for server-class applications ▪ Easier setup and administration of clients ▪ Remote access to network and files

What is the 3000 Sequence?

At Intel, our processor sequence numbers are intended to help clarify processor features, capabilities and intended usages. Intel offers four processor number sequences for server applications:

- **Intel® Xeon® processor 3000 sequence:** One-processor servers for small business, education, and for customers looking for their first server based on the Intel Xeon processor.
- **Intel® Xeon® processor 5000 sequence:** Two-processor general-purpose, standard high-volume servers, HPC systems, and workstations based on the Intel Xeon processor.
- **Intel® Xeon® processor 7000 sequence:** Greater scalability with 4- to 32-processor enterprise servers based on the Intel Xeon processor.
- **Intel® Itanium® processor 9000 sequence:** Maximum performance and scalability for RISC replacement usage with 2- to 512-processor servers.

Intel® Xeon® Processor 3400 Series

Third-generation Intel Xeon processor 3400 series is based on Intel's next-generation microarchitecture, integrates up to 8 MB L3 cache, a Dual-Channel Memory Controller with support to up to 32 GB of DDR3 memory, a x16 PCI Express 2.0 serial I/O controller, and Intel Virtualization Technology. Intel Xeon processor 3400 series provides significant performance headroom, especially for multi-threaded applications, with technologies such as Intel Turbo Boost and Intel Hyper-Threading Technology, which helps improve application responsiveness and system utilization through virtualization.

Processor Number[1]	CPU Frequency	L3 Cache Size	Intel® HT Technology[3]	Intel® Turbo Boost Technology[2]	Number of Cores	Power[a]
Intel® Xeon® Processor X3470	2.93 GHz	8 MB	▪	▪	4	95 W
Intel® Xeon® Processor X3460	2.80 GHz	8 MB	▪	▪	4	95 W
Intel® Xeon® Processor X3450	2.66 GHz	8 MB	▪	▪	4	95 W
Intel® Xeon® Processor X3440	2.53 GHz	8 MB	▪	▪	4	95 W
Intel® Xeon® Processor X3430	2.40 GHz	8 MB		▪	4	95 W
Intel® Xeon® Processor L3426	1.86 GHz	8 MB	▪	▪	4	45 W

[a]Thermal Design Power

Intel® 3400 Series Chipset

Intel 3400 Series chipset is a consolidated chipset architecture that integrates multiple platform capabilities in one small package. Intel 3400 Series chipset provides new levels of I/O capabilities, cost-effective data protection, performance, expanded security, virtualization and power management options.

Chipset Number	Intel® Matrix Storage Technology	SATA Ports (3 Gb/s)	PCI Express* 2.0 Ports	USB 2.0 Ports	Legacy PCI	LAN
Intel® 3400 Chipset	–	4	6	8	4 Devices	Integrated MAC
Intel® 3420 Chipset	RAID 0, 1, 5, 10	6	8	12	4 Devices	Integrated MAC

Learn More

For more information on the Intel Xeon processor 3400 series, visit www.intel.com/xeon.

For more information about Intel Microarchitecture codenamed Nehalem visit www.intel.com/technology/architecture-silicon/next-gen.

[1] Intel® processor numbers are not a measure of performance. Processor numbers differentiate features within each processor series, not across different processor sequences. See www.intel.com/products/processor_number for details.

[2] Intel® Turbo Boost Technology requires a Platform with a processor with Intel Turbo Boost Technology capability. Intel Turbo Boost Technology performance varies depending on hardware, software and overall system configuration. Check with your platform manufacturer on whether your system delivers Intel Turbo Boost Technology. For more information, see www.intel.com/technology/turboboost.

[3] Hyper-Threading Technology requires a computer system with a processor supporting Hyper-Threading Technology and an HT Technology enabled chipset, BIOS and operating system. Performance will vary depending on the specific hardware and software you use. See www.intel.com/info/hyperthreading/ for more information including details on which processors support HT Technology.

[4] Intel® Virtualization Technology requires a computer system with an enabled Intel® processor, BIOS, virtual machine monitor (VMM) and, for some uses, certain platform software enabled for it. Functionality, performance or other benefits will vary depending on hardware and software configurations and may require a BIOS update. Software applications may not be compatible with all operating systems. Please check with your application vendor.

[5] Intel® Intelligent Power Technology requires a computer system with an enabled Intel® processor, chipset, BIOS and for some features, an operating system enabled for it. Functionality or other benefits may vary depending on hardware implementation and may require a BIOS and/or operating system update. Please check with your system vendor for details.

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All dates and products specified are for planning purposes only and are subject to change without notice.

Relative performance for each benchmark is calculated by taking the actual benchmark result for the first platform tested and assigning it a value of 1.0 as a baseline. Relative performance for the remaining platforms tested was calculated by dividing the actual benchmark result for the baseline platform into each of the specific benchmark results of each of the other platforms and assigning them a relative performance number that correlates with the performance improvements reported.

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